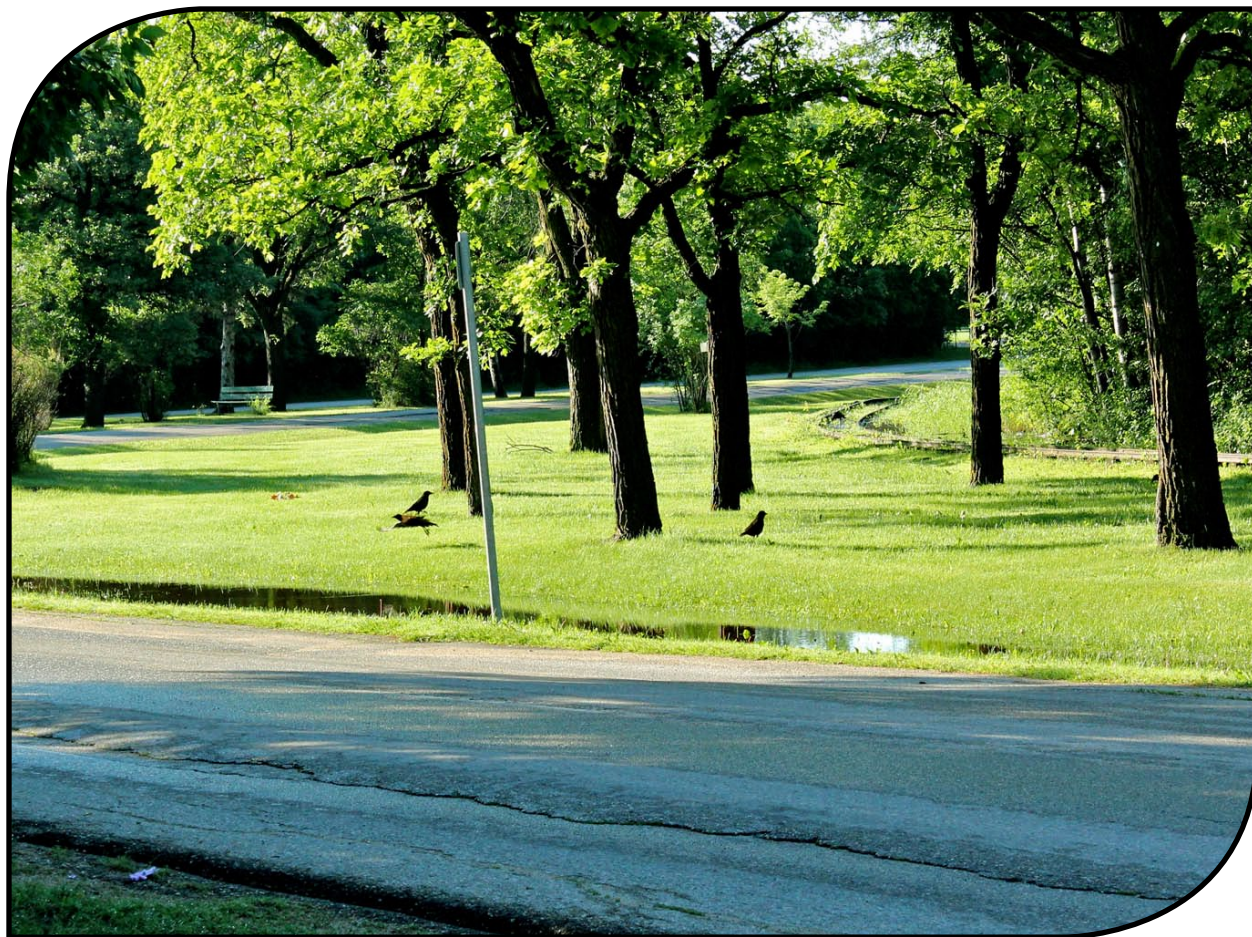


Population Surveys



A family of 3 American Crows feed on lawn



Swallowtails



American Robin



POPULATION SURVEYS

10

Unless one is able to survey a small, isolated population where all the birds can be marked and sexed, a researcher must decide how large a sample is needed to provide an adequate reflection of what the larger population is doing. Surveys take many forms and use many methodologies, which makes comparisons between them difficult.

Scale and spatial synchrony

A species like the American Crow that inhabits a broad and diverse North American landscape poses problems for the ecologist. At what scale should the species be studied. Locally, the establishment of a new landfill area that is surrounded by ideal nesting habitat may result in a population surge of crows. Continentally, before the population shift (downward in some locations) from West Nile virus, the North American population of American Crows was showing a steady, slow increase.

The Breeding Bird Survey (BBS) data generated several questions. How large was the spatial synchrony in abundance? Was spatial synchrony dependent on the natural history of a species?



Population surveys, like this photograph of a fledgling 3 days after leaving the nest, lack sharp focus and never give a very clear picture

From the computer models “landscape structure indicated that habitat variables were infrequent contributors to spacial synchrony.” Natural history traits also seemed to have no meaningful effect. Furthermore, researchers suggested that most species of birds were not regulated at spacial scales of a similar size because of the unevenness of spacial synchrony across species. Finally, “the spacial scale of the population synchrony patterns we describe is likely larger than the actual scale of population regulation and the scale of population regulation is undoubtedly larger than the scale of individual ecological requirements.”

Based on broad habitat characteristics in models for the American Crow, the forest landscape had 9 parameters compared to 33 parameters for the forest–wetland–urban–cultivated–landscape. In all 6 models, the forest was the recurring feature j46.

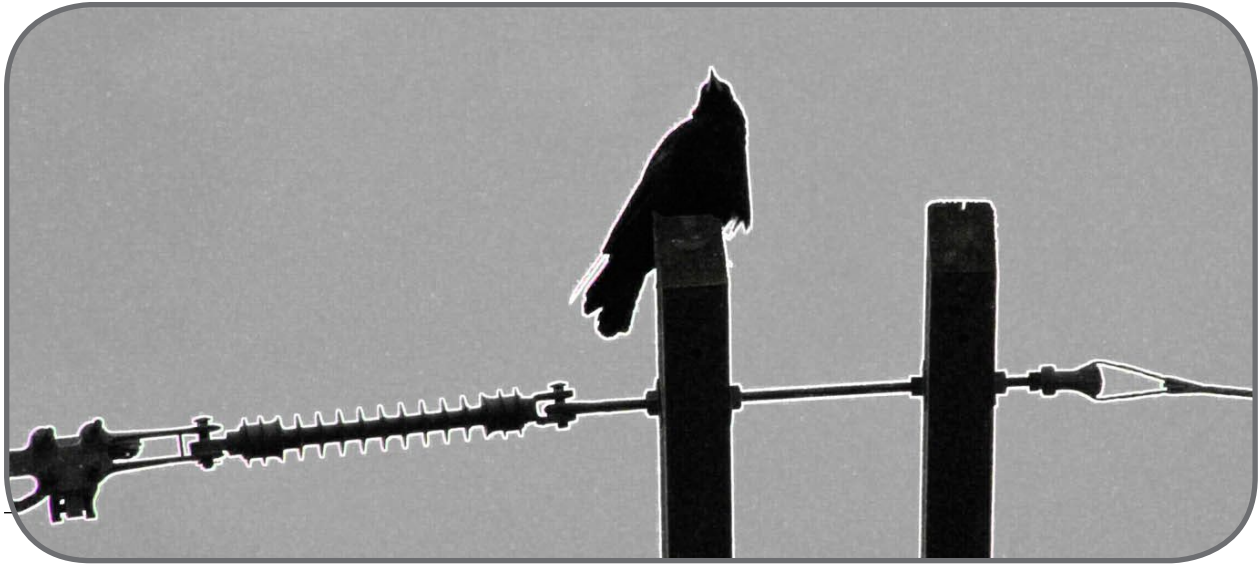


Crow surveys

Problems with bird surveys

Numerous surveys on the American Crow have been conducted across North America. But not all survey methodologies are equal. Consequently, the results of surveys varied in their equivalency, reliability, and usefulness. As sampling techniques go, a roadside census has a few shortcomings. Twenty (20) experienced bird-watchers were subjected to indoor and outdoor listening trials. As the number of audible singing birds increased from one to four, the fraction of them recorded by the listeners declined by up to 50%. And when only one bird was present, in half of the species studied, two birds were recorded





The crow looked right, then left, then up, as it did its own quick survey

more often than no birds present. This condition held true for the American Crow. Instead of an “efficiency” of one, when one crow called, an average efficiency of 1.1 existed. By the time four crows were calling in the field, the efficiency dropped to 0.6 for the listeners, which resulted in an underestimation of the population change. This violated the basic assumption of a roadside census index, an assumption which relied on the same proportion of birds in the population being detected no matter what size the population. The errors came not only from masking noises, but from the hearing ability of the participants, the sexual status of the birds (unmated ones may sing more than mated ones), and the affect one bird’s singing had on another bird’s singing. “If efficiency increases with density, then the survey tends to overestimate a change in density” b40.

After more investigation, 12 of 20 experienced birders under-counted the number of American Crows heard, while 6 of 20 over-counted the crows present in a simulated taped bird census. Favoritism for certain bird species appeared to influence the variability in recording errors on the part of birders b41.

The calling of birds varies with the species present. When passerines of 4 species inhabited an area, to avoid song overlap in late June, a bird of one species started singing immediately after another close bird species stopped its singing.

When alone, the same species sang more often at regular intervals than when in a crowd. The short-term temporal adjustments of song by singing birds was demonstrated in the field p81.

There are always differences in the skills of people doing breeding bird surveys (BBS). To obtain an idea of changes in a bird’s population, the observers should ideally provide an unbiased account of what they saw and heard. However, birders differ greatly in skills, ego, and likes. “Observer differences in numbers of birds counted were found in 50% of the 369 species examined. For many species, observers in later years tended to count more birds than observers in earlier years, suggesting an increase in observer quality over time.” Older = better. Not including the variability of observers in the BBS analysis gave “an overly optimistic view of population trends” s23.

After some comparative statistical work, it was decided a double-observer (2 observers recording birds at the same point at the same time) method at point counts for birds was the way to go. This eliminated the “variation in estimated detection probabilities” when only one observer was employed. Use of a variable circular plot at each point count was also helpful n24.

Then researchers went a step further and provided the unreconciled double-observer method (UDM). This method provided equally suitable estimates of abundance and probability of detec-





tion, as did the double-observer method (DM), but with much less effort. The 2 observers were at the same point-count location, and each made an independent count at the same time, without consulting each other. When the point-count was finished, they moved to the next point and began counting again. As an estimate of the population N , the UDM was less precise, but also less biased. The nature of the birds sampled, and the

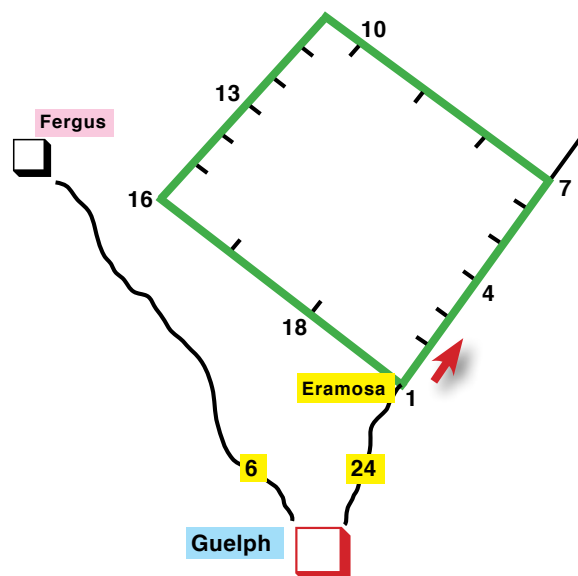


Some leaves of Bur Oak remain attached over-winter, as do some families of crows to their territory in **Winnipeg**

nature of observers used were also part of the equation ^{r74}.

In **Texas**, point-count surveys were analyzed for a limited number of species over the winters. There was an attempt to increase the efficiency and statistical significance of the methodology and results. For 167 unlimited-distance point counts of 13 species, the count duration, time of day, site type, winter date, and year were compared. For the Northern Cardinal, sampling from 09:15–13:45 was the most effective / efficient time period ^{g86}.

Gaps in some research literature dealt with the American Crow in the **San Francisco Bay** area. After a good start of field research from 1911–1960, publications dropped off in the 1960s, and a couple of decades passed



442. The location of 18 roadside stations used to look and listen for American Crows in the mornings for 4 years. An index of their population fluctuations is presented in **Graph 444**

with very little data on the crow. In the 1980s, there was an increase in publications on crows in urban areas. In conclusion “cultural patterns of the scientific community influenced observations of crows and ravens” ^{e23}.

Crows near Guelph, Ontario

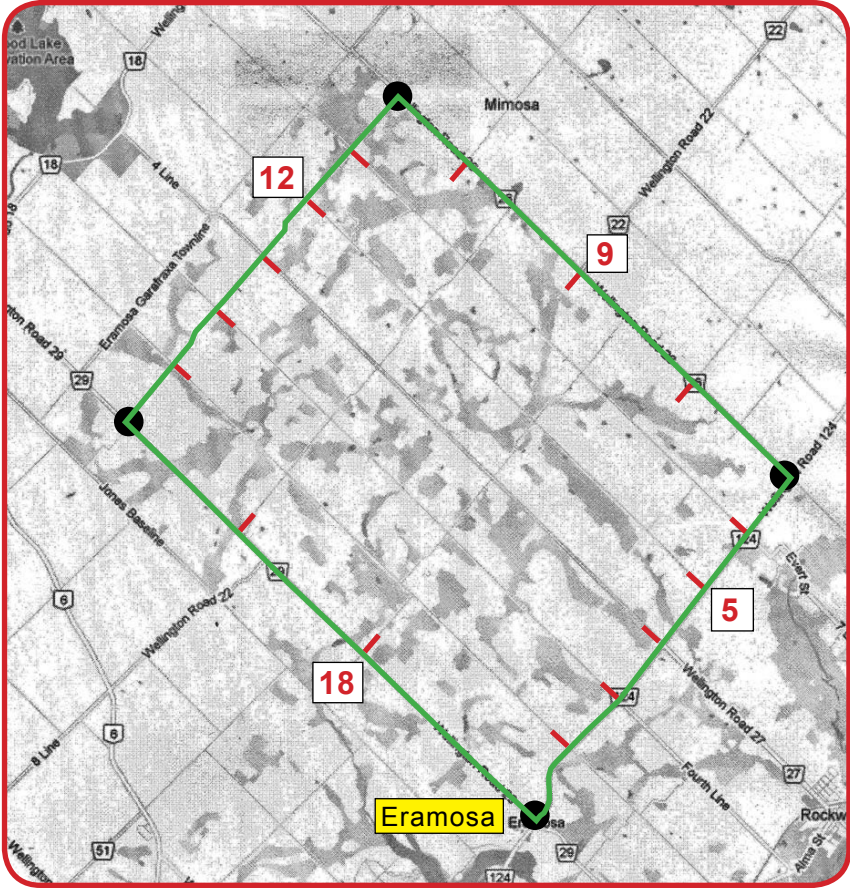
To appreciate monthly abundance and changes in a local crow population, I established a 34-km roadside census in the farming district north of Guelph **Ontario** (**Maps 442 & 443a**). Eighteen stations, each about 2 km apart, were set at road junctions. This 4-year morning exercise ran from January 1982 to December 1985. It was not intended to be a breeding bird survey. Suitable trees for nesting were plentiful in the area, but not one nest was seen from the road, although juvenile crows were heard begging for food in June and July. The area was part of the vast heartland for breeding American Crows in southern Ontario ^{c07}. No ravens or magpies were observed.

Generally, the countryside was rolling farmland producing small grains, corn, hay and pasture. Weedy fields were interspersed with deciduous and coniferous woodlots. A general quick survey of the habitat was made from my powerful





car on 3 August 1985, shortly before the census was completed. I drove the circuit and counted the habitat types (for example, corn field, deciduous woodlot, pasture, etc.) from the road to about 100 meters in, including homes and barns. (Map 443a) In all, 243 separate areas of 16 habitat types were counted, amounting to several types per kilometer. The Habitat Type and Frequency of Occurrence are listed below.



443. Eight types of crops are included in the 16 habitat types recorded 3 August 1985. The 18 station, 34-km circuit was used to census monthly fluctuations of American Crows from 1982–1985 (4-years) near Guelph **Ontario**

443a. Starting at the town of Eramosa (1) the green roads were driven anticlockwise with 2 minute stops at road junctions (1–18 in red) in a study area northeast of Guelph **Ontario**. I surveyed the American Crow's monthly population for 4 years, starting in 1982. Dark gray areas are woodlots, © Google Maps

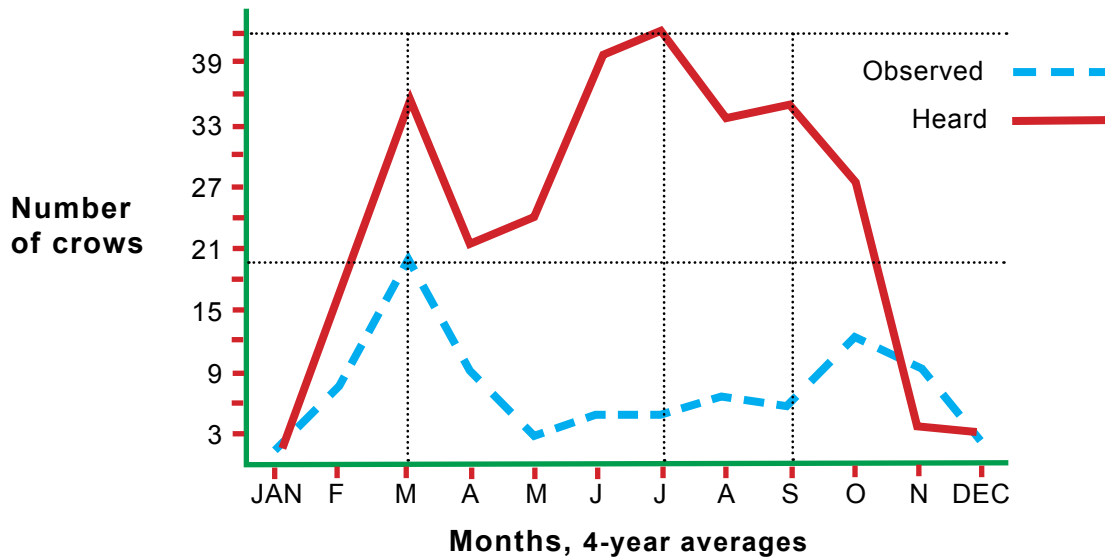
HABITAT TYPE	FREQUENCY	
	#	% of 243
(1) House, barn, small store	80	33%
(2) Barley, oats, winter wheat	29	12%
(3) Corn	27	11%
(4) Weedy field	26	11%
(5) Hay2	23	10%
(6) Stream or ditch	14	6%
(7) Pasture	9	4%
(8) Deciduous woodlot	8	3%
(9) Coniferous woodlot	5	2%
(10)Soybeans	5	2%
(11)Pond	5	2%
(12)Truck garden	4	2%
(13)Cattails	3	1%

(14) Cultivated seedbed	3	1%
(15) Buckwheat	1	—
(16) Cemetery	1	—
TOTAL		243 100%

Rising early, I entered the dawn before sunrise. Beginning at the town of Eramosa (station 1) on paved highway 24, I drove the 34-km circuit in an anticlockwise direction. At each of the 18 roadside stations, I stopped and stood beside my powerful car to record the number of crows seen and heard in unlimited directions and distances over a 2-minute period. A crow both observed and heard was marked as observed, the visual record taking precedence over the auditory one. One complete circuit took about 80 minutes. The



Population Surveys



444. The average monthly number of American Crows recorded (seen and heard) was the highest at the peak of spring migration in March near Guelph **Ontario**, 1982–1985. July was also a good month to hear crows, especially the begging notes of juveniles wanting to be fed

circuit was completed about once a month on an aspen-still Sunday morning when roadway traffic was light. Windy, rainy and snowy days were used to oversleep.

During the four years, 51 circuits were completed. The monthly average of 4 counts per station fell within a range of 2 in January and 8 in October. No wintery crow roosts existed within or near the circuit. At certain consecutive stations, a crow midway between them could have been recorded twice. The counts were therefore an index; not an absolute number of crows.

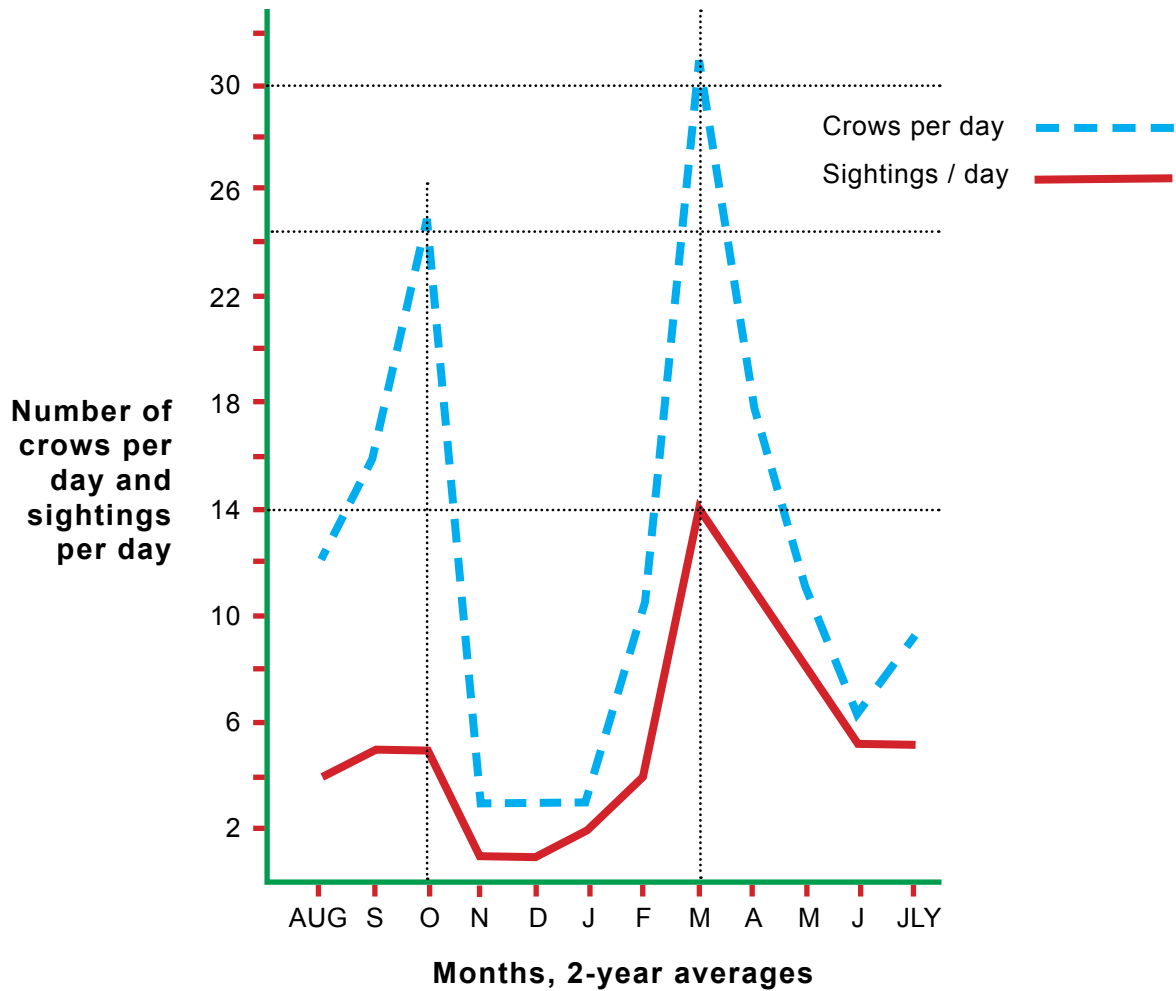
Traffic noises, although not continuous, did prevent me from hearing all the faint calls of distant crows. The average number of vehicles tearing past me during the 36 minutes devoted to listening per circuit was 9 (0–18). Traffic was heaviest through stations 1–7, along the paved 2-lane road, and lightest at stations 11–18 along gravel roads. My listening ability also suffered from interferences by lesser noises from other birds, dogs, cows, chickens, insects and the wind. To compensate for these disturbances, I slightly extended some of the listening times, or waited until a rushing car passed before I began to listen. Compared to the auditory element of this census, the visual part retained a higher degree of consistency from year to year. On a clear, calm

summery morning, timing of an ideal census progressed like this –

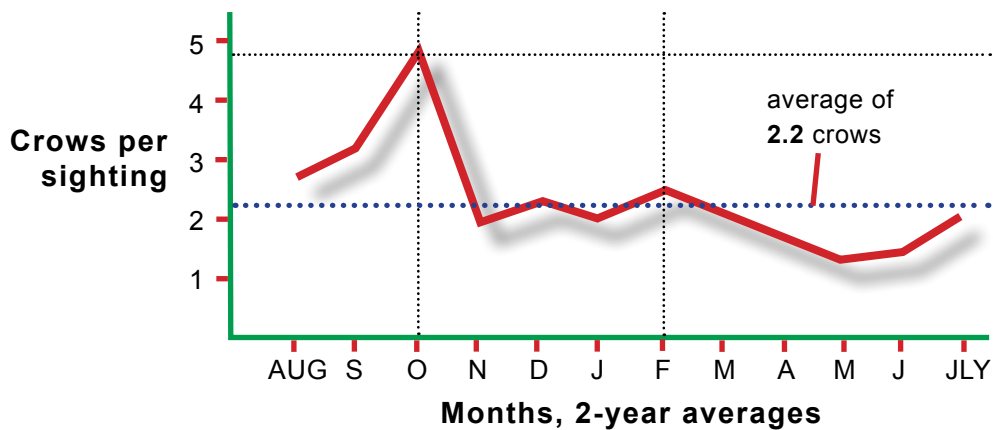
04:15 birds began to sing
04:27 a dog barked
04:33 first robin sang
04:44 300 gulls flew over
04:52 first crow called
05:00 census began
05:09 sunrise
06:22 survey finished; breakfast

The number of crows heard each month outnumbered those observed, except in early November when a couple of isolated, small flocks of migrating crows came into view (**Graph 444**). February was a famine to feast time due to the influx of crows that migrated northward during the latter part of the month. This was clearly shown by comparing the average number of crows observed (5) and heard (5) in the first half of the month to those observed (11) and heard (28) after the 19th of February. March was the most flamboyant month in the spring. Its peak in **Graph 444** was due to a large number of small groups of migrating crows plus those returning to local territories, the latter highly visible and perched in undressed trees. Crows were more vocal at this time





445. The average number of sighting and American Crows counted per day peaked during the migrations in October and again in March in southern **Ontario**, 1981–1983 combined. The number of crows counted per day was the highest in March, during the start of the breeding season when crows were active on territories and migrating to the northeast. Refer to **Table 332 in Feeding**



445a. The average number of American Crows per sighting was 2.2 birds. The peak average of 5 crows was in the fall migration in southern **Ontario**, 1981–1983 combined. The monthly, graphic results of my 2-year survey. See **Table 332 in Feeding**





of the year. Once nesting got under way, (April–May) the birds were more secretive and quieter, which caused a sharp dip in the graph. Summer was again a vocal time, but now the birds were invisible when perched among the trees in costume. A rapid drop occurred in September–October, as crows left the area for the south. Over the winter months, the crow population was at its lowest level. Wintering crows were recorded at only two or three of the 18 stations. Yet, even during the abundance of summer, rarely were crows noted at all 18 stations.

I conducted a second survey while making deliveries to dairy farms in southern Ontario for two years (1981–'83). The results are discussed on **pages 332–335** in Feeding. The average was 2.2 crows (the size of a typical family unit) per sighting (**Graphs 445 & 445a**). About 28% of the sightings and 35% of the number of crows were categorized as feeding (**Table 332**).

Other Canadian surveys

In the early 1970s researchers established 5 plots of about 25 ha for a census of birds in Kitchener / Waterloo **Ontario** c28. The crow was listed as one of five species nesting on all five plots. An average of 9 (4–23) territorial pairs of crows were found per 100 ha in downtown and suburban areas. More work around Waterloo in the mid-1970s involved populations of birds during the winter on eight square census strips. In five different habitats (open water excluded) the average number of crows per 100 ha was 12 (1–89) with mixed forest containing the highest population e01. When the winter population in Wellington County was sampled using 11 square census strips, crows were found in only four of the designated six habitat types. The crow population averaged 1 (0–6) birds per 100 ha. The coniferous forest and urban forest categories held the majority of American Crows p67.

Two surveys in **Ontario** in the 1960s, meant to census daytime birds, took place in Ontario (now Durham) County. Using road grids in 10 urban centers, crows were located in only 2 plots over the summer. Port Perry had the highest total of 6 birds per 40 hectares 27s. A much higher level of crow activity was found on 11 plots in the



An American Crow perched near the top of an undressed tree in winter was included in a survey

forested areas of Ontario County. There were only 2 plots without crows in May and June. On the remaining 9 plots, the estimated number of birds ranged from 2–24 per 40 ha. Crows were most abundant in the late stages of succession, but were also found in pioneering forests 28s.

Two more researchers analyzed BBS counts in 1971 in relation to 3 general habitats of fields (6 subdivisions), forests (7) and urban (4) in Waterloo County in southwestern **Ontario**. Four BBS routes about 12 km apart covered the county from east to west. For this agricultural region,



Bur Oak cups dispense their fruit in the autumn





We survey American Crows and they survey us. In some ways they know more about us than we know about them. For example, they can identify individual humans without banding them

the 3 main habitats amounted to – fields 74%, forests 14%, and urban 11%. The abundance of the American Crow (birds per 100 stops) for the 3 habitats was fields 75%, forest 85% and urban 42% with an average of 78%, giving it a ranking of 8th among the 40 species tallied. Crow abundance in fields with hedgerows was 74% compared to 62% in fields without deciduous hedgerows. The weekly counts of crows from 18 May to 16 July averaged 149 (110–171). The lowest count of 110 was from 18–21 May, when large nestlings were being fed. The highest count was from 19–23 June, when family units of juveniles and their parents decorated the earth ^{w45}.

In **New Brunswick**, birds were counted visually by one person over 10 winters, 1977–1988, on a 50 ha plot that included part of the town of Sackville (pop. 6,000). Dubbed the Winter Bird Population Study (WBPS), Erskine recorded 25 species including the American Crow. The crow was one of the species that maintained its numbers from 1–2.5 over the 10 years. Other species were noticeably scarce to absent in the final two years of his survey, possibly due to land and building changes ^{e53}. In Cumberland County **Nova Scotia**, in the late 1890s, the crow was listed as common all of one winter; the raven was not common, with only two pairs counted ^{55m}.

Along the eastern shore of **Newfoundland** the bird population on the mainland (South Head) was set against that on Gull Island in the Wit-

less Bay Seabird Sanctuary. The island was 0.95 km² and situated 1.6 km from the mainland. The census took place along transects about 1.5 km long in each location from May–July 1977. On Gull Island 13 species of passerines were noted, and 25 species on South Head (mainland). Eleven species were common to both areas. The American Crow was recorded on the mainland but not on Gull Island. The Common Raven was recorded at both sites, although only twice on the mainland over the summer ^{v07}.

Townsend visited **Cape Breton Island** from 17 August to 5 September 1905. Travelling on water, on foot and by vehicle, he recorded 98 avian species. He and others commented on how tame the American Crows were on the island. One fellow thought the lack of planted corn for crows to decimate allowed the people on the island to tolerate them. [Perhaps the islanders liked and



A huddle of spruce cones





enjoyed this prince of birds and didn't buy into the corn / crow-induced hysteria in other parts of North America. Not hunted, it was approachable. Four crows were together on the roof of an outhouse in Ingonish, near the island's tip t68.

and 19% were feeding.

In and near Saskatoon **Saskatchewan**, 12 random 1 km transects were surveyed twice in the last 10 days of both May and June, 1988–1990 for bird abundance and diversity. The transects took



During a 5-day visit to New York City in late 2011, I did not see or hear an American Crow – spooky

In **Winnipeg** I conducted a short visual survey by recording the activities of American Crows in the city from the start of February until the end of September 2012. The purpose was to discover where and how crows spent their days in the city. The two categories were perching and feeding. A flying crow was ignored. No large roosts formed in Winnipeg. **Perching** was divided into 4 parts, and **Feeding** into two parts. In total I recorded 480 crows in groups of 1–12 birds from 297 sightings. The few larger groups of crows were in the spring when gatherings formed. The average was 1.6 crows per sighting. A breakdown of crows and sightings –

PERCHED ON

Poles 68 (1–2), 14% of the 480 crows
Buildings 70 (1–10), 15%
Trees 213 (1–12) 44%
Wires 10 (1–2) 2% of the crows

FEEDING ON

Lawn 95 (1–10) 20% of the 480 crows
Pavement 24 (1–4) 5% of the crows

Overall, of the 480 crows counted, 75% of the birds were perched, and 25% were feeding. Of the 297 total sightings of crows, 81% were perched

about 12.5 minutes to complete, and birds seen or heard (42 in May; 32 in June) within 90 m on both sides of a transect were counted. Rural transects were off-road in farmland with native grasslands, and urban transects were along streets with part of a park in 3 of the 6 transects. In the urban and rural transects, American Crow numbers fluctuated from 12, 1, 12 in June in the city and declined (80%) over the 3 years in rural areas in June. In May breeding crows were feeding nestlings and were relatively quiet. In late June, juveniles were calling to be fed. In the discussion it was not mentioned if the begging calls of juveniles were added to the tally. In the article, if you look at the total number of crows recorded in Tables 2 and 3 during the three years, May had 33 and June 34, which indicated stability^{09s}. [Fluctuations in number recorded within such a small sample size in a short period of time are to be expected for American Crows. One urban cat walking beneath a tree with an active crow's nest would do it.]

In the 1940s of west central **Alberta**, from Athabaska to Lesser Slave Lake to the Grande Prairie area near the BC border, American Crows were seen almost daily, often in small numbers. On 11 July, about 120 birds were noticed at La Glace Lake. At Bear Lake, the nestlings began to fledge on 21 June. On 1 August, several flocks were between Spirit River and Fairview^{17s}.





American surveys

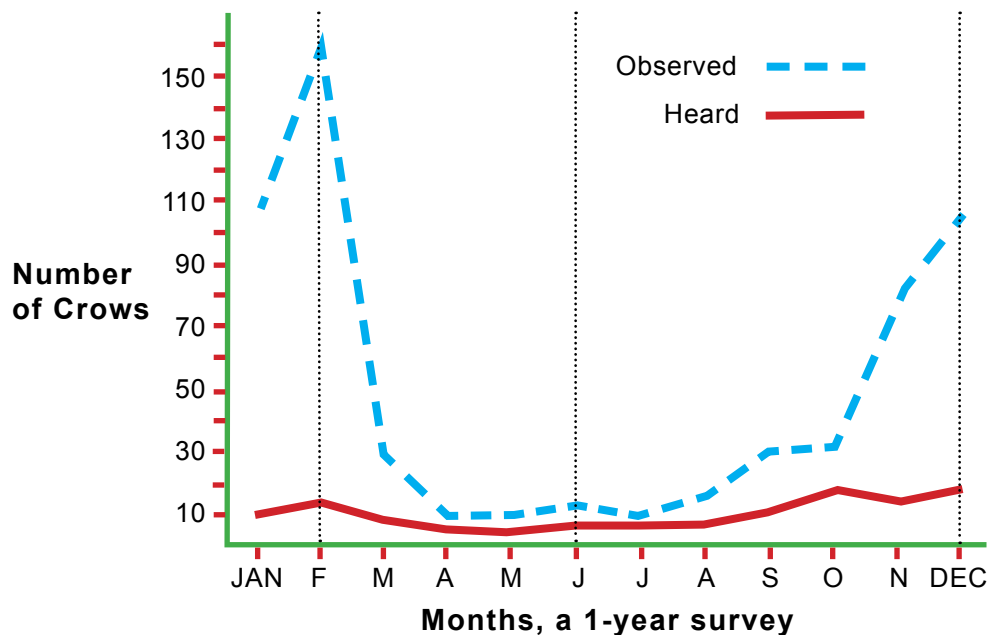
The timing of a roadside census to index singing birds has traditionally been carried out in the morning, to take advantage of the dawn chorus. For some species this does not appear to be necessary. Counts made over several hours gave a better indication of species richness (crows not included) than did a small period of census time in one hour v22.

For example, in Union County **New Jersey**, Shields sampled a 1.6 km transect in the winter. He detected no significant difference in contact with American Crows over three hourly starting times – 08:00, 09:00, and 10:00, although there was a slight increase later in the morning. Over the summer there was a small (again not significant) decrease (3 to 2.8) in number of crow contacts made at the latter of two starting times of 06:00 and 07:30 hours. Mornings were more productive than evenings with 62% of all individual birds admitted, including the crow 43h. If you recall my daylong surveys of a family of crows on the campus in **Guelph**, the first two hours after they began calling at dawn contained an average of 46% of the day's total vocal output. For a vocal

census of the American Crow, I would start 10–20 minutes after sunrise (**Graph 454**).

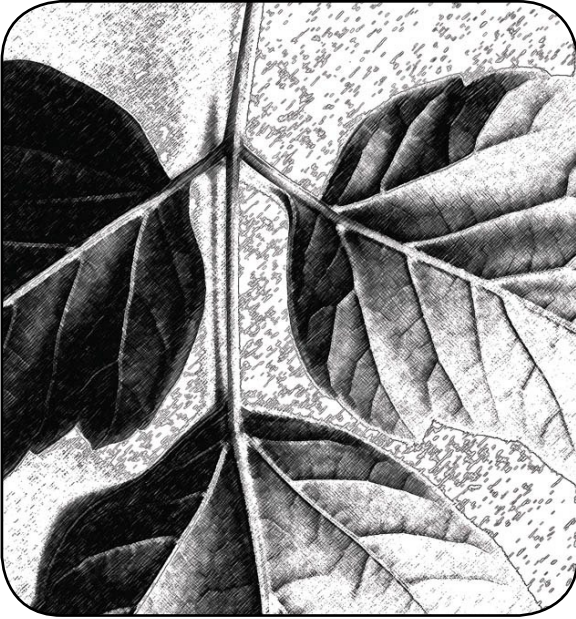
Kricher set up two study areas along the Piedmont in **New Jersey**. One was a semi-open 5 ha field with Red Cedar, *Juniperus virginiana*, and the other a 26 ha forest with 3 species of oaks. The four, 2 ha plots were walked for 45 minutes in the morning and all birds recorded once a week from 17 December to 13 March in the 1970s over two winters. The 33 species heard included the American Crow with its mean importance value set at 1.1 (cedar field) and 8.4 (oak forest). The two most common species were the Black-capped Chickadee and Dark-eyed Junco. The importance value was the relative density + the relative frequency for each species. A perfect score for a species would be 200 13k.

In Knox County **Tennessee**, the monthly crow population fluctuations were revealed in a 1-year roadside census (**Graph 449 below**). In the country, 72% of the landscape was farmed. Communal roosts of crows gave relatively large counts of observed crows in the winter. The counts declined sharply by March as crows dispersed to their nesting territories. Over the summer, the resident nesting population was low. In October and



449. The peak of crow abundance occurred over the winter near a roost in Knox County, **Tennessee** during a 1-year roadside census in the late 1940s. Over the summer, crows were scattered and nesting in small family groups 43h





A Manitoba Maple's compound leaf

November, with the migratory influx of northern crows, the observed population increased toward its previous winter level. Throughout the year, observed crows always outnumbered the calling crows. It was concluded only summer populations that changed 30% or more were significant ^{43h}. The results of this short study were the anthesis of my 4-year roadside census (**Graph 444**) near Guelph **Ontario** where no winter roosts developed.

In the vicinity of **Washington DC**, 16 prominent ornithologists counted birds on 12 May 1913 along 13 routes. The wide wooded valleys of the Potomac and Anacostia Rivers were included. Although the species total, 129, was not as high as expected, the number counted totaled 12,257 individuals. The American Crow crossed the finish line in 9th position ^{o02}.

In the central-northern part of **Washington** state in the 1940s, Burdick made ornithological notes over the summer when he was stationed as a Lookout and Fire Fighter. From 11–29 June, large number of crows were observed daily at the Early Winters Ranger Station near Mazama ^{1b8}.

Over 100 volunteers in 1993–'94 took on a systematic count of birds in the city scape of Washington **District of Columbia**. In total, 91 species were observed in May and June and 115

were estimated to exist. The survey data were incorporated into a GIS to allow for a multidimensional analysis of species presence and number over 7 land use habitats. The habitats ranged from residential (low density) to commercial to industrial–airport. A total of 617 sample points were taken with the average number of species at 7 (0–20) per point. The top five encounters in 1993, based on the percent of occurrence at survey points were –

- (1) European Starling 86%
- (2) House Sparrow 71%
- (3) Chimney Swift 58%
- (4) **American Crow 56%**
- (5) Rock Dove 51%

The recorded birds were seen or heard between sunrise and 09:30 am during the survey. Twelve species were seen / heard at more than 100 sample points and 23 species occurred at only one sample point. From the 91 species, 71 (78%) were considered regular breeders in the District of Columbia. The American Crow was not assigned to any particular guild (group of species that have similar requirements and play a similar role within a community). It was recorded at 389 (63%) sample points. Based on land use class, the two top areas to find crows in May and June were parkland (73), and low density residential (67). The two worst areas in which to find crows were commercial areas (25) and high density residential (24) ^{h07}.

In the north central part of **Ohio**, during a preliminary study of birds in Seneca County, several large roosts were found in the winter of 1904–05. A few crow nests with 4 and 5 eggs were also located in April–May ^{h75}.

From a census in 3 counties in **Illinois** during the last week of March (1979–1981), the mean number of crows per 40 ha was from 1.4–9.2 birds. Censuses from 1 August to 3 November in the same years produced a mean number of crows per 40 ha of 1.4–27.7 birds ^{g55}.

In the southwestern part of the lower Peninsula of **Michigan**, Brewer looked for birds in Kalamazoo County in the 1960s. Two bogs were surveyed. American Crows were not recorded in the open bog, thickets, or tamarack forest. How-





ever, crows were found in the spruce, cedar and mixed forest types ^{71b}.

In the 2000s, bird populations were studied in the urban arena in the southeastern part of **Michigan**. Land-use policies set by state governments fell into two political categories. Home Rule existed in 11 states. This means “adjacent local governments commonly do not coordinate land-use planning efforts and therefore increase the likelihood of decentralized urbanization and increased fragmentation within the landscape.” Dillon’s Rule occurred in 39 states. It means “governments generally have more power to coordinate regional land uses.”

Bird habitats at the rural-urban interface were considered. Three landscape changes on a large scale were abandonment of agricultural practises, urbanization (growth of cities), and afforestation (conversion of land into forest where there was no forest). Grassland and urban bird populations declined due to habitat loss while woodland birds did not respond to afforestation. Yet, “the amount of matrix tree cover surrounding woodlots, parks, and other preserved set-asides may play a critical role in supporting area-sensitive species in urbanizing environments” ^{t17}.

In the northern part of Lake County, near the **Minnesota / Ontario** border, three summers in the 1920s were spent in the field taking photographs of big game. In the area from Gabro Lake to Lake Isabelle, several crows were seen in July and August. On the 5th of August 1915, a pair of crows with juveniles were near Lake Isabelle ^{j26}.

In **Kansas**, birds were surveyed in the 1990s using a modified BBS method almost every week for 14 winters in two northeastern counties. Averages and total numbers of species were linked to the length of daylight and weather. With more than 15 cm of snow cover, the number of species per station was much reduced when compared with no snow on the ground. Nevertheless, the American Crow and Black-capped Chickadee, *Poecile atricapillus*, were the only two species seen / heard on all 194 censuses. In all, 61 bird species were recorded. There were differences in the detection of species among the 14 winters. Five hypothesis were presented ^{38s}.



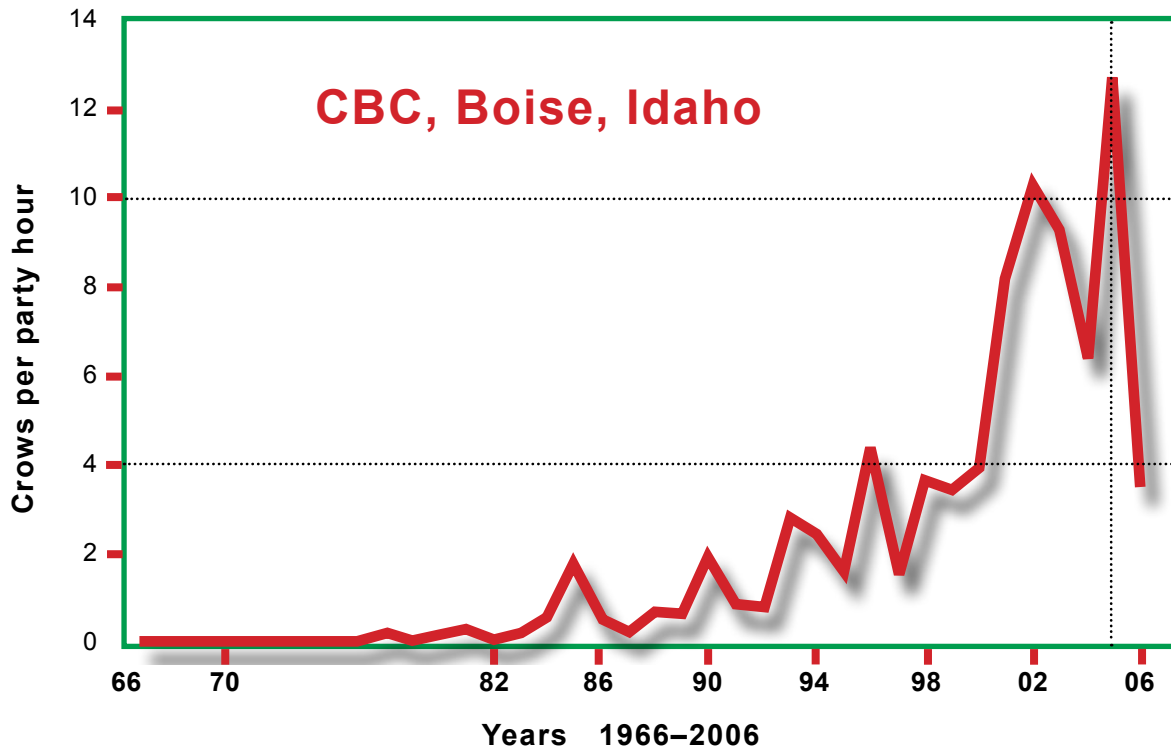
Sixth Avenue in New York City is a commercial and high density residential area where few crows walk

A party of 4 men set out in the 1930s to gather information on the bird life in **Oklahoma**. The American Crow nested in two counties – Roger Mills and Ellis. A nest held 5 small young on 12 May in Roger Mills County ^{93s}. Hanowski and Niemi in the early 1990s compared on- versus off-road bird counts at two National Forests in **Minnesota**. By habitat, different species were recorded and in varying numbers. The total of species at both locations would give a complete picture ^{h25}.

In the 1990s in central **Georgia**, a comparison was made of bird populations in burned and unburned pine forests in the Piedmont National Wildlife Refuge. Birds were surveyed over the summer using fixed-radius point counts. During mornings, 46 nesting species were seen and heard on more than 10% of the counts over the 3 years. The American Crow had a frequency of occurrence in burned of 84% and unburned 75%. The crow placed 10th in the list of species detected across the two habitats ^{w75}.

Forty birders conducted 18 road surveys (average 50 km long) for Common Ravens and American Crows over the 1999 breeding season in the **San Francisco Bay** area. The crows showed substantial increases from the outer coast toward the interior and bayshore areas, while the number of ravens dropped over the same route. There were fewer crows along rural, urban / sub-





452. After a steady increase from about 1984 in the number of crows tallied during CBCs at Boise **Idaho**, a drop after 2004 may be due to the advent of West Nile Virus t16

urban routes. Exceptions did occur to this pattern. Local conditions, where there was rapid human growth, may encourage population growth for both crows and ravens. “The inverse relationship between abundances of ravens and crows did not correspond to differences in rural versus urbanized habitat.”

Based on two periods of Christmas Bird Counts in the San Francisco Bay area, the mean number of American Crows per count circle were averaged. A slight regional increase was evident in recent decades k25.

1950–1998 Average 345 crows
Range 2.5–1,548 (18 count circles)

1980–1998 Average 378 crows
Range 3.4–1,604 (17 count circles)

There were changes in breeding birds over 45 years at the Bird Haven Sanctuary and Arboretum in Richland County **Illinois**. American Crows bred only in the woods from 1907–1910, but in both the

woods and farm habitat from 1945–1955 59s.

In the 1960s and 1970s, American Crows were not especially common in the towns of **Idaho**. The crows were fairly common outside of towns like Nampa and cities like Boise. Around 1980, crows began to infiltrate towns, at least over the winter. Christmas Bird Counts in and around Biose, the capital of Idaho, recorded only one crow from 1966 to 1975. From 1976 to 1980 the average jumped to 5 crows and increased to 110 by 1983. Meanwhile, since the 1950s in nearby Nampa, a more rural area, thousands were recorded on each CBC. On the Idaho State University campus in 1997, about 900 crows were roosting. Across southern **Idaho** crows were taking advantages of nesting opportunities in small towns. At first an increase in agriculture equaled an increase in rural crows. From 1966–1979, the BBS revealed an annual increase of about 6% in the crow population, while the CBC for Idaho indicated a downward trend. The shift of crows from a rural to urban life was probably spurred by the persecution [hunting] of rural crows in the 1960s





and early 1970s. During those two decades, boys were encouraged to kill them. By the late 1970s, the thinking toward crows began to change, at least in the towns. In 1972, American Crows for the first time were included in the Federal Migratory Bird Treaty Act of 1918, which offered them some protection. About the same time, the Snake River Birds of Prey Conservation Area was established to protect raptors. Attitudes were changing and crows were starting to fit the ideas and ideals of a new era ¹⁶.

In the northwestern corner of Washington County in **Arkansas**, a record was kept of the number of birds seen per hour from June 1952 to May 1953. From 8 categories of habitat, the figures below are for the Flood Plain area, where most of the birds were seen. The resident American Crow, presented below, always ranked in the top six ²⁵ –

1952–'53		
Months	% frequency	average # / hour
July–May	93	2.8
Nov–Feb	38	0.7
July–Sept / Mar–May	54	1.5

In **North Dakota** a statewide nesting survey was repeated. Breeding pairs in 1992–1993 were compared to those in 1967. It was a visual and aural survey. American Crows showed little change. The frequency of occurrence over the 3 years was – 1967 (19), 1992 (9) and 1993 (19) and the statewide breeding estimates came to

60,000 pairs of crows in 1967 compared to 28,000 pairs in 1992 and 58,000 pairs in 1993 ¹⁰³.

In the 1930s, the birds in two townships of Cass County **North Dakota** were sampled in the field for 8 years. The list amounted to 187 species in the southeastern part of the state. The American Crow was a common summer resident, occasionally lingering over the winter when the weather was not severe. Most of the migration of crows occurred in March and October ^{40m}. In the late 1960s in North Dakota, random quarter-section units were utilized to sample the state's bird population. In all, 30 pairs of crows were recorded, which was 0.3% of all pairs of all species recorded. The projected population in North Dakota was 65,000 (41,000–89,000) crows ^{49s}.

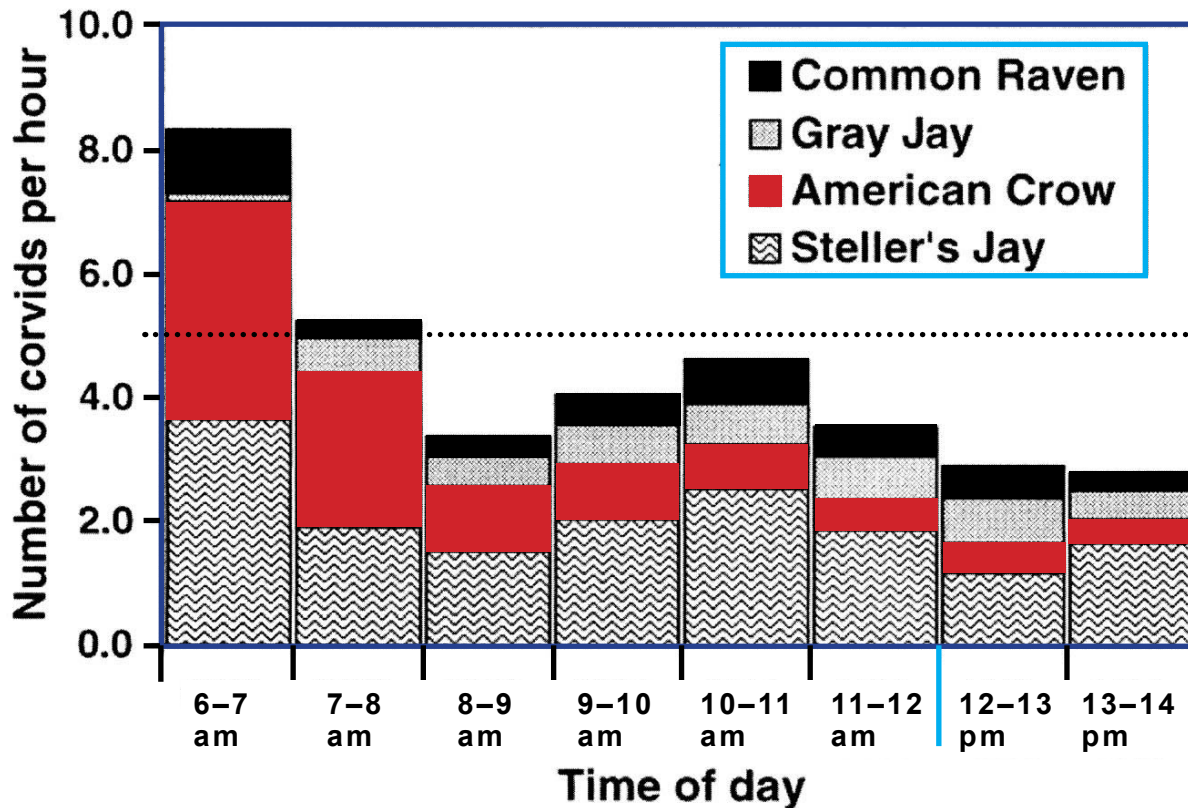
In western **North Dakota**, nesting birds were attracted to wooded draws in five counties. Coal reserves were below ground. Above ground, three common trees were Green Ash, *Fraxinus pennsylvanica*, American Elm, *Ulmus americana* and on the gentle slopes, Box Elder, *Acer negundo*. Grazing altered the understory in the draws.

A census of the breeding bird populations in the mornings throughout June 1982 used a line transect in 30 draws. Forty-seven (47) species (23% of all nesting species in North Dakota) were recorded in the wooded draws. Periodic surveys of the habitat adjacent to the draws added another 23 species. The average number of species was 13 (8–18) per draw. The two most common birds (90% of the 30 draws) were Brown-headed Cowbirds and Rufous-sided Towhees. The American Crow was recorded on 2 or (7%) of the transects. Birds in the family Corvidae were counted



American Crows fly early and give their first calls about 20 minutes before sunrise





454. Early in the morning is the ideal time to detect **American Crows** and other corvids. Abundance (mean number per 10-minute point-count) is best determined in good weather on the Olympic Peninsula, **Washington**, USA I81, © Association of Field Ornithologists

on 4% of all habitat surveyed f01.

A different kind of census lasting two years was held in Dakota County **Minnesota**. The vertical use of trees and shrubs by birds in seven farmstead shelter belts was investigated. As it turned out, the majority of crows (79%) were in the canopy, while about 10% utilized each of the midstory and ground stratum. Furthermore, crows were observed most often in 4 of 13 vegetative genera: *Populus* (63%), *Pinus* (20%), *Picea* (10%), and *Ulmus* (7%). Planting these species would generally benefit crows and other bird species that use shelterbelts for food, shelter and nesting sites y01.

Facing in another direction, a study was held on the Thistlethwaite Wildlife Management Area in **Louisiana**. It was an old floodplain – always a good birding area. As the deciduous forest changed over the years, the spatial distribution of the birds changed annually. Oak (*Quercus*) was the main genus. An index was developed for the

vertical sightings (4,103) over two years of 26 avian species on the WMA at different heights in 4 zones – from the ground to above the canopy. The Black Vulture, *Coragyps atratus*, was regulated to the highest zone with an index rating of 3.50. The White-throated Sparrow had the lowest index at 1.27. As crows (n 52) are not ground feeders in woodlots, they wore the second highest index badge at 3.04, with 40% of the sightings flying above the trees; 30% in the 7.6 m to canopy top zone; 25% from 0.6–7.6 m and 5% from 0–0.6 m (the ground zone) d49.

fargo reported on American Crows along the middle western edge of **Florida**. In March and April 1926, a few were noted around a slaughter house north of Tarpon Springs. At the same time, Fish Crows fed in flocks around habitations and at heronries where they took eggs. They stole many eggs from chickens f05.

In **Florida** in the early 1980s, Maehr com-





bined data from three surveys of bird use on phosphate-mined lands. Surface extraction accounted for over 90% of the phosphate mined in the United States from 77,000 hectares. Some mines were reclaimed, others were not. A total of 176 bird species were listed in 4 categories –

- (1) unreclaimed mines
- (2) early successional settling ponds
- (3) late successional settling ponds
- (4) reclaimed mines

The American Crow and Fish Crow were common year-round birds. Generally, unreclaimed mines become marshes and were attractive to wetland bird species. Reclamation practices resulted in a rather sterile habitat of little use to wildlife m17.

In a 6-acre residential area in Cambridge **Massachusetts**, changes were recorded in nesting species from 1860 to 1964. In the periods 1860–1873 and 1900–1904, crows did not nest. But from 1940–1943 and from 1960–1964, one pair of nesting crows was located. They were permanent residents. The amount of natural habitat declined from 95% to 15% by the early 1960s, with the added insult of spraying insecticides during the last two periods w06.

In several locations in the **United States**, comparisons were made of crows in cities and in the country. In western **Washington** state, the relative abundance of crows, based on point counts of birds seen and heard, increased from the rural to the urban environment. In wild areas, crows were noticed where openings from roadways or campgrounds existed. Consequently, crow abundance was 30 times higher in the city compared to areas of wilderness. There was a tendency for an increase in urban crow populations from 1960–1966, while remaining relatively stable in the country and wildlands w06.

In the **Midwest** from 1992–'95, transect counts of birds were completed in 6 states – Michigan, Indiana, Iowa, Missouri, Nebraska and Kansas. The winter counts compared avian abundance and species composition in Conservation Reserve Program (CRP) fields against row-crop fields.

- (1) For CRP fields of grasses (native and intro-



A singing Gray Catbird in nearby shrubbery can interfere with hearing the more important birds such as American Crows during a summer census

duced) and legumes with high vertical densities, the mean abundance of all species for the 6 states was 2.3 (0.9–4.3) birds per km of transect. The total species per state averaged 13 (6–32). The two most common species were the American Tree Sparrow and Ring-necked Pheasant.

- (2) For row-crops the mean abundance of all species for the 6 states was 4 (1–9) birds per km of transect. The total species averaged 12 (8–18). The top two species were the Horned Lark and American Tree Sparrow.

The American Crow, although low, was twice as abundant in row-crop fields (average 0.06 birds / km of transect) compared to CRP fields at 0.03 birds. Crows were absent in transect counts in Missouri and Nebraska over the winter. As expected, bird abundance declined with an increase in snow depth 06b.

In the Seattle area of **Washington** state, Withey and Marzluff studied the dispersal of juvenile American Crows and their related abundance in different habitats in the early 2000s. Their overall area of about 2,400 km² was mainly coniferous cover, but ranged from the urban (in Seattle) with more than a 50% built area, to least developed wildlands with less than a 2% built area. They surveyed crows monthly, October 2000 to December 2001, within the Christmas Bird Count circle enclosing Seattle. The counts were relatively stable at about 80 crows per party hour except in April and May (about half the nests were being incubated those months) when it dipped to about 40 crows per party hour. The CBC provided a reliable trend in the population throughout the year and was in agreement with the Breeding Bird Survey





(BBS) over the summer, as long as roosting crows in the city centers were counted and handled the same way each year. The procedure was to begin counting crows about an hour after sunrise, which allowed time for the birds to leave their roost and disperse.

They radio-tagged (11 grams) 56 juvenile (HY) crows from July–September. They divided feeding into 6 categories (garbage to inverte-



A pair of crows stayed in this spot (anting?) on a lawn for several minutes in **Winnipeg**

brates on native plants, etc.). They set 30 September as the date when juvenile crows became independent of their parents and joined a communal roost. The fate of the 56 radio-tagged crows –

- 18** (32%) remained within 1.5 km of the nest (local); actual mean distance was 0.7 (0.2–1.5) km
- 15** (27%) dispersed more than 2 km from the nest; actual mean distance was 9 (2–22) km
- 6** (11%) had an early death
- 8** (14%) had transmitter failures
- 9** (16%) were unknowns

18 (32%) of original 56 survived to the next April

A crow was arbitrarily considered to be dispersed if it moved more than 2 km from its natal area and remained in a new activity center. Even though their numbers were small, all the dispersers, still alive the next spring (n 6), were found in urban areas, which suggested a trend. Males that remained at their natal area in urban, suburban or exurban areas were observed helping their parents with mobbing, territorial defence and carrying food to the nestlings. Juvenile female crows were more likely to disperse than males. The juveniles (n 73) foraged in –

- (1) Refuse 40%
- (2) Below-ground invertebrates in lawns 37%
- (3) In native vegetation 10%

Crows captured in flocks during the winter in urban areas had ratios of 97 young to 23 adults (4 to 1). Crows in exurban locations had ratios of 30 young to 22 adults (1.5 to 1). Dispersed crows fed in the company of about 8 birds compared to local crows that fed with a family group of about 4 birds. Dispersed, young, non-breeders generally ended in the urban areas and contributed to a net gain of about 22% of the population growth in that area. Our garbage (their food) in any city may be one reason why crows are attracted to where we congregated 19w.

In the early 1970s, a survey of 6 urban parks of various sizes was conducted within the city limits of Seattle **Washington**. The vegetation, degree of modification of the plants, and size of each park were related to the diversity and abundance of its bird population. One control area, Lee Forest, was summoned. Throughout May and June a strip census method was conducted 8 times. The transect was 46 m wide and all birds seen and heard within its boundaries were noted. The 7 parks averaged 48 ha and varied in size from 2 to 8 ha for small parks, and 69 to 113 ha for larger parks. The average number of American Crows observed per census per 762 m of transect was 4.5 within a range of 0.6–11 birds, including the control area. Crows were a common urban species in the city of Seattle. As expected, the large forested parks with much native plant diver-





sity attracted the highest diversity of native bird species. The small and or greatly changed parks, as far as vegetation went, held fewer but more of the typical urban bird species g11.

In the mid-1980s, Wilcove w89 redid a bird survey done 35 years earlier by Fawver f12 in the Great Smoky Mountains National Park along the **Tennessee** and **North Carolina** borders. Wilcove worked at 10 localities of 5 types of mature forest. He repeated as closely as possible the two census techniques of Fawver; a spot-mapping of singing male birds, and cruising counts of singing males within a predetermined distance on either side of a transect line. At one locality where Fawver heard no American Crows, Wilcove recorded 0.8 breeding pairs per 10 ha. At two other localities, again where Fawver heard no crows, Wilcove heard 2.4 and 1.3 pairs per 10 hectares. Fawver saw crows in and around the park in 1947–1948. Wilcove found crows at three sites including a breeding pair with two fledglings, and saw crows in the park almost daily at dawn. He thought the increase of crows in the park may be due in part to human activities around the park and more roads and road kills in the park.

In the southern Appalachian mountains of **North Carolina** and **Tennessee** results were compared from two surveys 50 years apart – the first from 1944–1946 (45 spp), the second during 1996–1998 (51 spp). From the combined total of breeding species, similar numbers increased and decreased in abundance. American Crows showed an increase in rank abundance. Crows, along with the Indigo Bunting and Song Sparrow, expanded into the forest along the edges provided by a new parkway built for our powerful automobiles h23.

■ In a similar fashion, two residentially developed and 3 undeveloped sections were compared for breeding songbirds along the shore of Lake Superior in **Michigan**. In the fine-scale comparisons of relative abundance, the American Crow and American Robin were significantly “more abundant on the developed shoreline side of the shoreline access roads.” Making point counts between May and July 2005,

five crows were detected in the developed site compared to none in the undeveloped site (unfragmented forest) f57.

To finish this section, at the start of the 1900s, when corn was an exotic crop in **Illinois**, a bird census took place over the summer f52. The workers employed a strip census method and covered almost 690 km or 1/4,720th the area of the state. Of the 21 most common birds encountered, the crow stood 21st, at 1%. Star billing went to the House Sparrow at 18%. Later surveys estimated the crow population in Illinois dropped 72% over the 50 years (1907 to 1957), due in part to lack



A juvenile crow watches the sun go down. Generally crows rise before sunrise, and before sunset families of urban crows are in their roosting trees

of nesting habitat, even though corn production greatly increased during that period g56.

The estimated winter crow population in **Illinois** in January 1907 was 4.8 million crows, compared to only 1.4 million in January 1957. The summer population numbers followed the same trend – June 1909 had an estimated 1.2 million crows while June 1957 had 0.3 million crows. Perhaps changing weather or habitat (farming practices) were responsible for the large decline in the number of crows in the state g55.

In the late 1990s in central **Pennsylvania**, nesting success of Neotropical migratory song-





birds was checked in relation to various habitats, spacial arrangements, and possible predators. The two disturbed landscape sites were forested with patches of farmland, and silviculture (clear-cuts less than 15 years old). Each study site had similar amounts of forest cover (39% and 35%). The American Crow had a higher index of abundance (1.15) in the broken forested landscape compared to the silviculture one (0.10) ^{03r}.

In the early 1900s, many articles in journals were annotated lists of bird species seen / collected in small areas of North American. For example, a list of birds in western **South Dakota** in the early 1900s was based on the work of 6 earlier travellers in the region. The Red-winged Blackbird was described as a “common summer resident.” The American Crow was “*tolerably common*” ^{v25}. In a list of birds in the Parry Sound area of **Ontario**, in the late 1890s, Fleming noted that crows were abundant around settlements, and fed



Spring – American crows in a deciduous tree

with a pair of ravens in the same field ^{f41}.

Winter birds (permanent residents) over three seasons in part of Central Park, **New York City** included the American Crow, “one spent the winter of 1899–1900, and I saw one flying overhead February 16, 1901” ^{09r}. In 1905, at several locations during a year in New York City, the crow was described as a “very common permanent

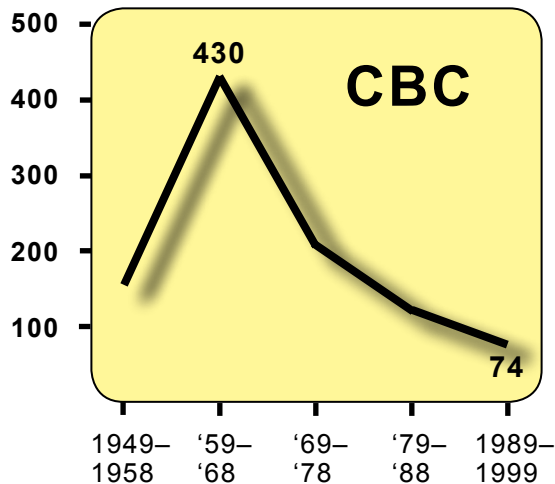
resident.” ^{h99}

In Muskingum County **Ohio**, east of Columbus, two researchers in the 1930s spent a total of 25 days (walking, riding) looking for birds. Total species count was 65. Starlings and American Crows each had a roost in the area, which made them the two most commonly recorded species, even ahead of the House Sparrow. For the whole state, the Starling was ranked 12th, and the crow 4th. The researchers thought “The Crows and Starlings have made a decided drain upon many winter food resources ordinarily available to other species” ^{h93}. In my opinion, the 1930s was the decade when declared hatred for the crow became public in the media. And for the most part, the hatred was founded on lies and myths, which educated but gullible people believed and continue to believe and perpetuate to this day.

Langley chartered the changes in the published CBCs in **Kansas** from 1949 to 1997. Wichita, in the south-central part of the state, had a general increase in its winter crow population after 1973, which continued into the 1980s. Smaller towns also reported more crows. West of Wichita, in Stafford County, tens of thousands to a million crows were reported in the 1940s to mid-1950s. By the mid-1980s only small numbers of crows were reported in Stafford County. Part of the reason may be due to the removal of Catalpa groves, which the crows used for roosting. Meanwhile, trees in the towns and cities grew and matured, and crows responded by moving into these safe havens to spend the night. In the late 1980s about 12,000 crows were reported for Wichita and this jumped to 100,000 in the 1996 CBC ^{l18}.

A 50-year report was generated on 14 wintering species in the Halstead-Newton CBC (end of December) in Harvey County **Kansas** from 1949–’99. As usual, the number of birds tallied increased when counters spent more time in the field. Eight party-hours were expended in 1966 compared to 78 party hours in 1998. The count of individual birds formed a linear relationship to the number of party hours. The standard was number of birds per 10 party hours. Over the 5 decades, the median count of crows per 10 party hours was 86 birds. The number of crows dropped considerably from 1969–1978, and this trend continued through the next two decades ^{p70}.





459. KANSAS A dramatic drop in numbers of rural American Crows from the 1960s through the 1980s may be due to their shift from roosts in the country to those in cities and towns. Or perhaps the crow migration into Harvey County was not yet complete in December, which caused fluctuations of numbers. Some crows from Manitoba probably spend their winter in Kansas.

Graph reveals the median counts of American Crows per 10 party-hours over five decades of the Halstead-Newton CBC in Harvey County, central Kansas p70, © Kansas Ornithological Society

In Moffat County in northwestern **Colorado**, in a landscape dominated by sagebrush, a visual survey route 175 km long was driven in mid-winter while 3 or more people looked for raptors and scavengers. The Golden Eagle was the most abundant raptor (20–45) counted in each of the first 7 years, while American Crows were infrequently observed in only two years: 7 birds in 1988–'89 and 1 in 1991–'92. Black-billed Magpies were common b70.

On the Hart Mountain National Antelope Refuge in southeastern **Oregon**, 3 avian breeding survey types were compared. They were used to assess relative abundance of species in riparian habitat. In the end, it appeared that fixed-width line transects or fixed-radius point counts were comparable, provided there were at least 2 field trials during the breeding season. About 60 species were listed. The American Crow was noted by using line transect and point count methods. Spot mapping failed to detect crows d54.

ally by volunteers. The survey-wide trends from 1966 to 2009 (**Graph 460**), show only a small drop for American Crows, which may be attributed to the spread of West Nile virus in the first decade of the 21st century.

The Christmas Bird Count (CBC), organized by Audubon, has two parts. The animated driving part, and the stay-at-home-bird-feeder-watch part. Dunn looked at the way these two parts were handled. In 1975, the number of birds per time unit in the two parts were combined into the total data base. Generally, the feeder-watch total added little to the CBC totals. However in northern areas, as in most of **Canada**, increased feeder-watch effort and more birds in a wintering population that visited feeders could substantially introduce false trends into the final counts for certain species. For example, “when feeder-watching effort rose to 0.25 feeder-h / party-h, 17% of species’ totals were inflated by more than 10%.” American Crows seldom visit bird feeders, and those recorded had little effect on the total CBC numbers, even in northern latitudes. When volunteer counters in the field passed through harvested fields surrounding a large roost of crows, the number of crows recorded would far outnumber the few crows counted at feeders. The plan was to keep the two methodologies separate to make sure the data was more useful for long-range analysis of trends d72.

There exists a radio frequency identification (RFID) device used as an automated bird monitoring system. At a cost of about \$40, it was used to

The bigger picture

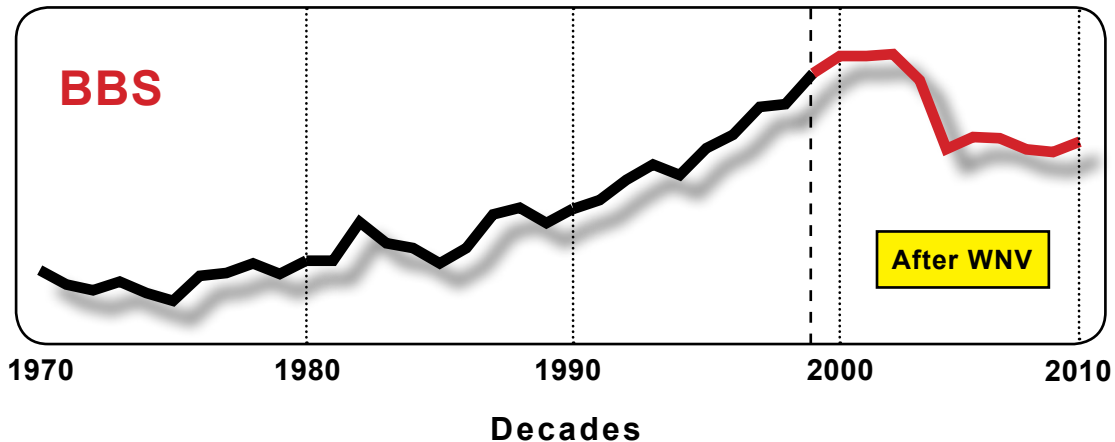
Christmas Bird Counts (CBC) and Breeding Bird Surveys (BBS)

The Canadian Wildlife Service and the Patuxent Wildlife Research Center combine forces to analyze and present the North American Breeding Bird Survey data gathered from the 3,000 or so routes surveyed annu-

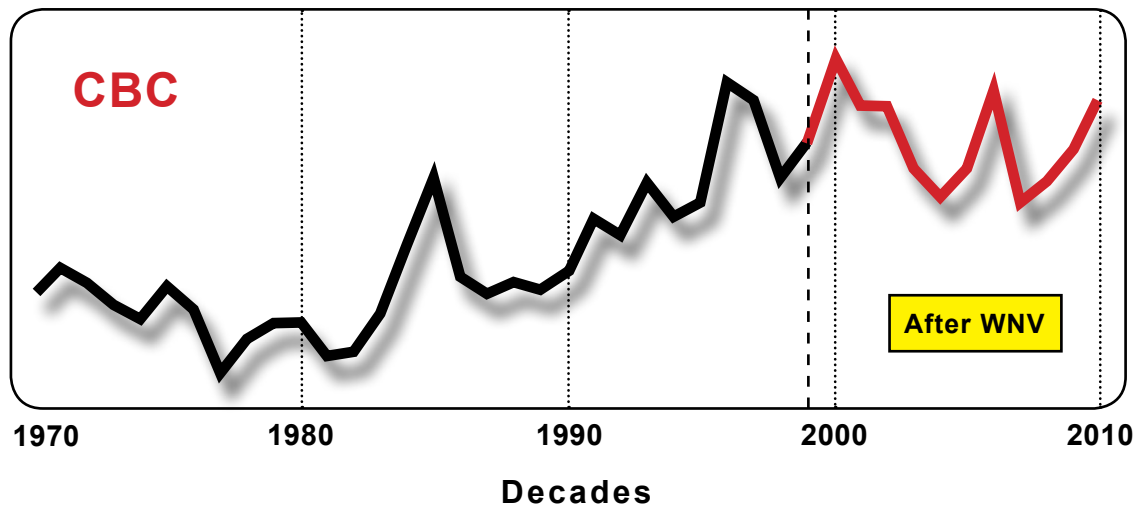




460. The red line shows the drop in the American Crow BBS population after the arrival in 1999 and spread of West Nile virus from New York City. Adapted from the online Breeding Bird Survey – Canada and United States combined, 1970 – 2010.
© Patuxent Wildlife Research Center and the Canadian Wildlife Service online



460a. The red line shows the erratic fluctuations in the American Crow CBC population after the arrival in 1999 of West Nile virus in New York City. Adapted from the online Christmas Bird Counts – Canada and United States combined. American Crow North American population trends (number of crows reported per party hour) 1970 – 2010. © National Audubon Society (2010). The Breeding Birds Survey Historical Results online <http://www.christmasbirdcount.org> [10Jan2013], Birds Studies Canada





Surveys on small islands involve a limited palette of plants and animals





Great Bulrush preparing to bloom in Winnipeg, late May 2013

monitor feeder visits in central **New York**. Operating at a low frequency, its range was less than 10 cm (4 inches). A bird, such as a Chickadee, must be wearing an appropriate passive integrated transponder (PIT) tag, which was taped to a celluloid leg band. The housed device was attached to the base of a PVC tubular bird feeder (metal disrupts the signal) that allowed only one bird at a time to access the food. Fights over access to the food led to missed visits ^{74b}.

For the annual CBC, graphs were generated using the number of birds reported per party hour; a measure of the amount of time spent searching for birds, or the amount of effort expended. This was a way to standardize the numbers over several decades (**Graph 460a**).

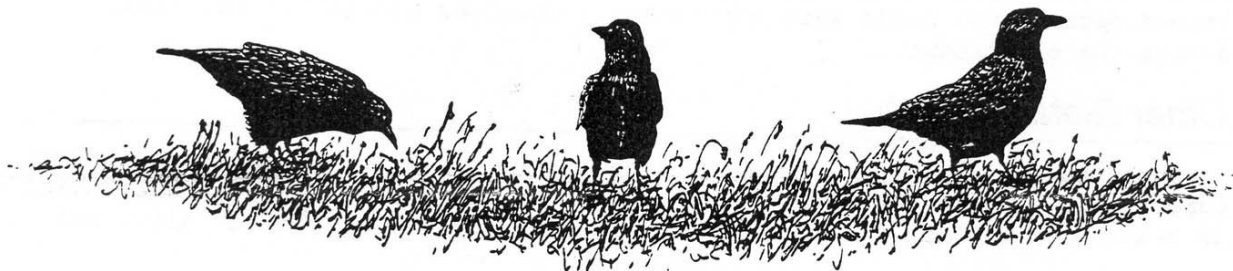
The lovely Spring breeze has come
Back to the Lake of the West
The Spring waters are so clear and
Green they might be freshly painted

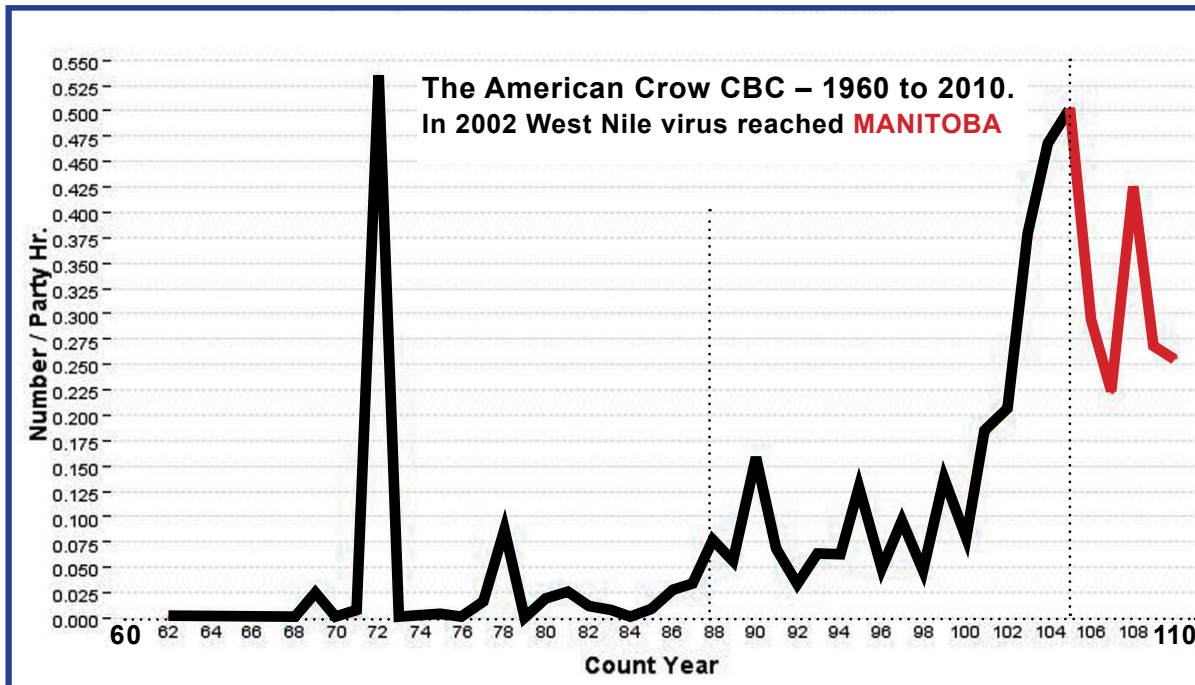
– Ou Yang Hsiu ^{r47}

Annual BBSs and CBCs have been published (some online) for many provinces and states. All the work by volunteers contributes to our general and particular knowledge of any species we care to research. I will only delve into two provincial annual surveys on the American Crow. For many states and provinces, their Atlas of Breeding Birds has also been published, and some are online including a map for each species.

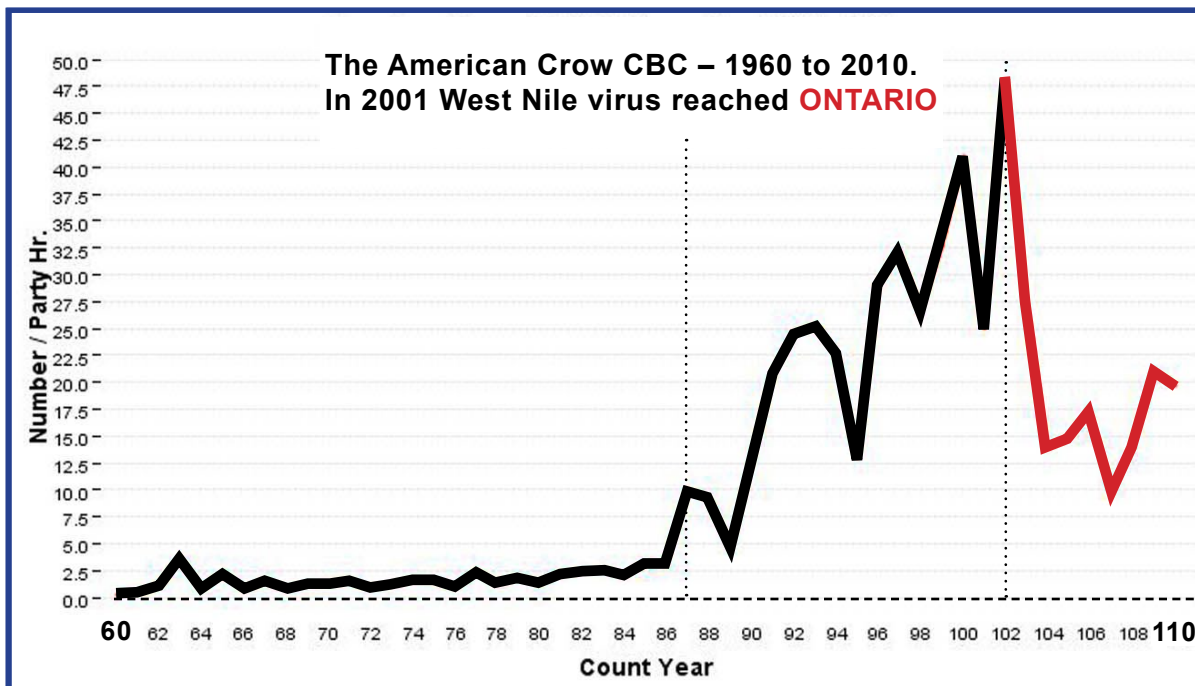
For the entire United States crow population, based on about 2,500 active routes, the population increased from 1966–1996 an average of 0.5% annually. Canadian crow populations remained stable based on about 2,300 active survey routes. During the 30 years prior to West Nile virus, the crow population increased by 1.3 times ^{s24}.

For Christmas Bird Counts (CBCs) in **Illinois** (1940–1983), the statewide average was 8.6 (7.8 in north to 10.3 central) crows per party hour, which did not include counts at crow roosts. General locations also influenced the outcomes – CBCs along three major rivers in the state gave





463. This CBC graph for **Manitoba**, Canada shows a general increase in crows reported per party hour beginning in the late 1980s. A decline in the number of crows over the winter began in 2005, perhaps due to the advent of WNV in Manitoba in 2002



463a. This CBC graph for **Ontario**, Canada shows a general increase in crows reported per part hour beginning in the late 1980s. A decline in the number of crows over the winter began in 2002, probably due to the advent of WNV in Ontario in 2001

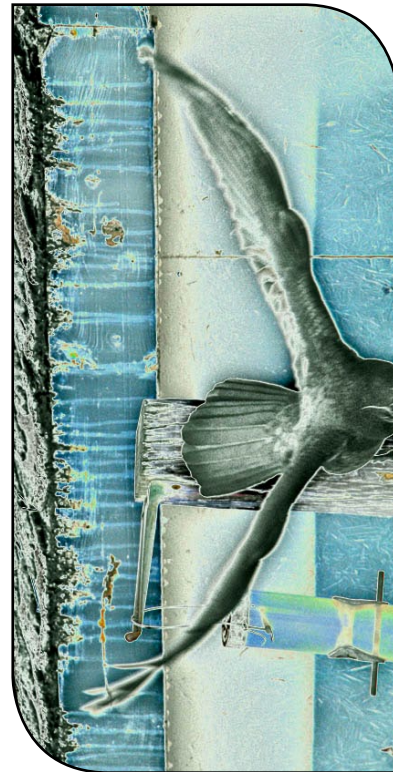




an average of 12.4 crows per party hour (pph) versus 2.3 crows pph away from rivers 955.

For the winter of 2007–'08 in **Manitoba**, from a total of 18 CBCs, there were 1,583 Common Ravens and 573 American Crows tallied for a ratio of 3 to 1. Nature Manitoba News, March 2008, **34** (2): 10–11.

A glance at the map and text generated for American Crows in the Atlas of Breeding Birds of **Ontario** from the 1980s tells us – breeding evidence on the crow was reported for 80% of the province, the densely forested areas and the tundra in the northern reaches experienced the lowest level of nesting activity. In southern **Ontario**, 11–100 breeding pairs over a 10 km² area was the most common estimate of abundance, while for northern Ontario, 2–10 breeding pairs was the figure provided c07. ■



Base of an American Elm meets the first snow in November

